

REMARKS

Applicant requests favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

As will be discussed in more detail below, the rejected independent claims now recite that a second electromagnet of an electromagnet unit is positioned away from a first electromagnet of the unit in a direction *perpendicular* to a direction in which a movable member, driven by the electromagnet unit, moves. In contrast, the elements in the Joong et al. patent that the Office Action identifies as corresponding to the two electromagnets — the magnetic pole teeth 11a and 22a — are understood to be positioned away from each other in a *parallel* to the moving direction of the moving element 6, as shown in Figure 1B of the Joong et al. patent. Therefore, the rejections of the independent claims are now considered to be unwarranted. Accordingly, Applicant respectfully requests that these rejections be withdrawn.

Claims 1-6, 9-12, and 14-16 are presented for consideration. Claims 1, 11, 12, 14, and 16 are independent. Claims 7, 8, and 13 have been canceled without prejudice. Claims 1, 5, 6, 11, and 12 have been amended to overcome a substantive rejection, while Claims 14-16 have been added to recite additional features of the subject invention. In addition, Claim 1 has been amended to overcome a formal objection thereto. Support for these changes and the added claims can be found in the original application, as filed, for example in Figure 2A, 11A, and 11B, and the accompanying text in the specification. Therefore, no new matter has been added.

Claims 1-5 and 7 have been rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,548,920 to Joong et al. Claims 6 and 8 have been rejected under 35 U.S.C. § 103 as

being unpatentable over the Joong et al. patent. Claims 9-13 have been rejected under 35 U.S.C. § 103 as being unpatentable over the Joong et al. patent in view of U.S. Patent No. 6,069,417 to Yuan et al.

Applicant submits that the cited art, whether taken individually or in combination, is not understood to teach or suggest many features of the present invention as previously recited in Claims 1-12. Therefore, these rejections are respectfully traversed. Nevertheless, Applicant submits that independent Claims 1, 11, and 12, for example, as presented, amplify the distinctions between the present invention and the cited art.

Amended independent Claim 1 relates to a positioning apparatus comprising a movable member movable in a first direction, and an electromagnet unit configured and positioned to drive the movable member in the first direction. The electromagnet unit comprises a first electromagnet, and a second electromagnet positioned away from the first electromagnet in a second direction which is perpendicular to the first direction. Each of the first electromagnet and the second electromagnet is controlled to generate a magnetic flux having an inverted polarity with respect to the other.

Amended independent Claim 11 relates to a charged-particle beam exposure apparatus comprising a charged-particle source for irradiating a charged-particle beam, a first electron optical system, having a plurality of electron lenses, for forming a plurality of intermediate images of the charged-particle source by the plurality of electron lenses, a second electron optical system for projecting the plurality of intermediate images, formed by the first electron optical system, on a substrate, and a positioning apparatus, holding the substrate, for driving a stage to a

predetermined position to perform positioning of the stage. The positioning apparatus comprises a movable member movable in a first direction, and an electromagnet unit configured and positioned to drive the movable member in the first direction. The electromagnet unit comprises a first electromagnet, and a second electromagnet positioned away from the first electromagnet in a second direction which is perpendicular to the first direction. Each of the first electromagnet and second electromagnet is controlled to generate a magnetic flux having an inverted polarity with respect to the other.

Independent Claim 12 relates to a device manufacturing method comprising a step of installing a plurality of semiconductor manufacturing apparatuses, including a charged-particle-beam exposure apparatus, in a factory, and a step of manufacturing a semiconductor device by using the plurality of semiconductor manufacturing apparatuses. The charged-particle-beam exposure apparatus comprises a charged-particle source for irradiating a charged-particle beam, a first electron optical system, having a plurality of electron lenses, for forming a plurality of intermediate images of the charged-particle source by the plurality of electron lenses, a second electron optical system for projecting the plurality of intermediate images, formed by the first electron optical system, on a substrate, and a positioning apparatus, holding the substrate, for driving a stage to a predetermined position to perform positioning of the stage. The positioning apparatus comprises a movable member movable in a first direction, and an electromagnet unit configured and positioned to drive the movable member in the first direction. The electromagnet unit comprises a first electromagnet, and a second electromagnet positioned away from the first electromagnet in a second direction which is perpendicular to the

first direction. Each of the first electromagnet and the second electromagnet is controlled to generate a magnetic flux having an inverted polarity with respect to the other.

Accordingly, in the present invention recited in independent Claims 1, 11 and 12, for example, a second electromagnet of an electromagnet unit is positioned away from a first electromagnet of the unit in a direction perpendicular to a direction in which a movable member, driven by the electromagnet unit, moves.

In contrast, the patents to Joong et al. and Yuan et al. are not understood to disclose or suggest a second electromagnet of an electromagnet unit positioned away from a first electromagnet in a direction perpendicular to a direction in which a movable member, driven by the electromagnet unit, moves. Moreover, the elements in the Joong et al. patent that the Office Action identifies as corresponding to these electromagnets —magnetic pole teeth 11a and 22a — are positioned away from each other along the x axis, the same axis along which a moving element 6 moves, as shown in Figure 1B. Therefore, the art applied against the claims neither anticipates nor renders obvious the invention recited in independent Claims 1, 11, and 12. Accordingly, Applicant respectfully requests that the rejections of these claims be withdrawn.

Dependent Claims 2-6, 9, and 10 also should be deemed allowable in their own right for defining other patentable features of the present invention in addition to those recited in independent claim 1. Further individual consideration of these dependent claims is requested.

New independent Claim 14 relates to a positioning apparatus comprising a first member and a second member having at least two sets of electromagnet units. Each of the electromagnet units has two electromagnets arranged on each side of the first member in a way to sandwich the

first member while maintaining a predetermined gap in a first direction. The apparatus also comprises a controller which controls current flow to each of the electromagnet units to drive the first member relative to the second member in the first direction. The electromagnet units are arranged away from each other in a second direction which is perpendicular to the first direction.

New independent Claim 16 relates to a charged-particle-beam exposure apparatus comprising exposure means for exposing a pattern onto a substrate, and a stage configured to mount the substrate and position the substrate based on a motion of a first member driven by a positioning apparatus. The positioning apparatus comprises the first member and a second member having at least two sets of electromagnet units. Each of the electromagnet units has two electromagnets arranged on each side of the first member in a way to sandwich the first member while maintaining a predetermined gap in a first direction. The positioning apparatus also comprises a controller which controls current flow to each of the electromagnet units to drive the first member relative to the second member in the first direction. The electromagnet units are arranged away from each other in a second direction which is perpendicular to the first direction.

Accordingly, Claims 14 and 16 recite that electromagnet units are arranged away from each other in a second direction which is perpendicular to a first direction in which a first member is driven relative to a second member.

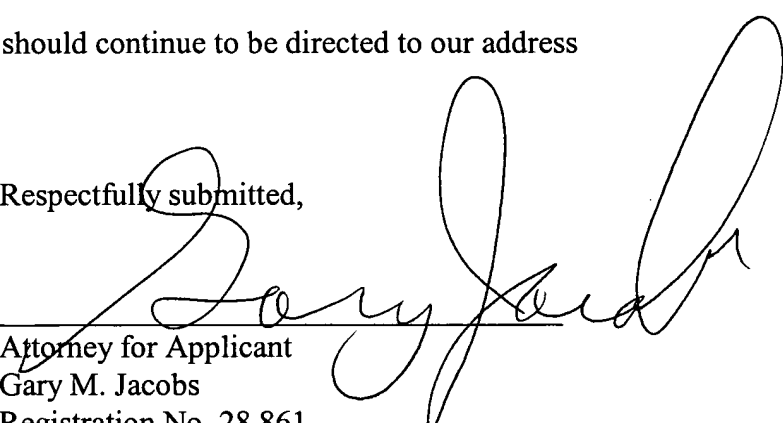
In contrast, the patents to Joong et al. and Yuan et al. are not understood to disclose or suggest electromagnet units arranged away from each other in a second direction which is perpendicular to a first direction in which a first member is driven relative to a second member, as recited by Claims 14 and 16. Therefore, these patents are not understood to anticipate or

renders obvious the invention recited in independent Claims 14 and 16. Accordingly, Applicant respectfully requests that these claims and dependent Claim 15 be allowed.

In view of the above amendments and remarks, the instant application is in condition for allowance. Therefore, favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action and an early issuance of a Notice of Allowance are respectfully requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our address given below.

Respectfully submitted,



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